ED359045 1993-03-00 Education-Business Partnerships: Scientific Work Experience Programs. ERIC/CSMEE Digest.

ERIC Development Team

www.eric.ed.gov

Table of Contents

If you're viewing this document online, you can click any of the topics below to link directly to that section.

ERIC Digests

ERIC Identifier: ED359045
Publication Date: 1993-03-00

Author: Kubota, Carole

Source: ERIC Clearinghouse for Science Mathematics and Environmental Education Columbus OH.

Education-Business Partnerships: Scientific Work Experience Programs. ERIC/CSMEE Digest.

Following public calls for educational reform, business and industry took a critical look at education and generated surveys, studies, and recommendations to catalyze change (Allstate Insurance & Fortune Magazine, 1989). Renewed interest in public schools by the private sector led to the idea of "partnerships" between education and business (Council for Aid to Education, 1989; Education Resources Group, 1991; National Association of Partners in Education (NAPE), 1991).

Although education-business partnerships take many forms, businesses most often join with local schools to provide: (a) guest speakers, special demonstrations, or use of their facilities, or (b) special awards, scholarships, or incentives for students (NAPE, 1991). Though such partnerships may enrich school programs, they do little to facilitate fundamental changes in classroom teaching and learning.

In contrast, this digest focuses on partnerships where businesses, government agencies, or university laboratories employ teachers during the summer months--a form of professional development--and the subsequent outcomes that appear to directly affect the ways teachers teach.

SCIENTIFIC WORK EXPERIENCE PROGRAMS: TEACHER-FOCUSED PARTNERSHIPS

One well established program is Industry Initiatives for Science and Math Education (IISME), founded in 1985 by a consortium of San Francisco Bay Area companies and government laboratories in partnership with the Lawrence Hall of Science at the University of California at Berkeley. The partners recognized the need for a skilled workforce in mathematics, science, and other technological fields, so they decided to "focus on teachers as the primary agents for effecting meaningful change in mathematics and science education" (University of California, 1991a). The IISME model has spread to 22 other states and to Denmark. According to a 1991 IISME survey:

* Over 5,000 teachers have participated in approximately 85 scientific work experience partnerships around the country since 1983.

* Approximately $7.2 million was distributed in 1992 to teachers employed by partner companies.

* Over 400 companies, 35 government labs, and 100 universities employed teachers for 4 to 10 weeks in 1992.

The scientific work experience partnerships have common themes; experiences are designed to expose teachers to new technologies, give teachers authentic work with real-world problems in laboratories or businesses, provide teachers opportunities to interact with scientists and other technically trained professionals, and assist teachers in transferring work experiences into classrooms (University of California, 1991b).

The effects of scientific work experiences can be measured on at least three levels. First level effects are on teachers and their teaching strategies. Qualitative information exists regarding such effects (e.g., Andreen, 1991; Beutel, Khashabi, & Marriott, 1991; Clark, 1989; Ehrman, Treadwell, & Young, 1991; Farrell, 1992; Gottfried, 1992; Kubota, 1991; University of California, 1991a). Second level effects are on students, as teachers transfer work experiences back to classrooms.

Some work experience programs are tied directly to programs that prepare teacher leaders (e.g., the University of Washington's Ford Fellows Science/Mathematics Project). Third level effects, then, are on schools or districts as teacher leaders begin to act as change agents within systems. There is virtually no information regarding second or third level effects, but most programs are working to develop strategies to measure the effects (Gottfried, 1992). A 1992 survey of 25 scientific work experience partnerships revealed that most programs are evaluated using teacher questionnaires and interviews, student surveys, and observations (Gottfried, Brown, & Markovits, 1993). Teachers who had scientific work experiences reported:

* Using new teaching strategies in their classrooms (Andreen, 1991; Beutel, et al., 1991; Farrel, 1992; Kubota 1991). Authentic teamwork, experienced by many teachers in the business world, becomes an important part of the classroom teaching repertoire. Rather than having all students work on the same laboratory exercise, teachers use their new understanding of teamwork to develop activities in which teams of students work on different parts of a problem and then come together as a class to discuss results. Teams rework their parts, meet again as a class, and eventually come to a conclusion. As teachers bring inquiry-based research methodologies into the classroom, they discover that how they teach is just as important, if not more important, than what they teach.

* Introducing updated content into the curriculum (Andreen, 1991; Ehrman et al., 1991). The increased content knowledge that teachers gain from business experience adds a new, real-world dimension to science courses. Teachers also gain and exhibit to their

students a new understanding of science as an inquiry-based, question-asking, problem-solving process.

* Increasing the use of computers in classrooms (Clark, 1990; Farrel, 1992). Although the software used by many teachers in a business experience is very sophisticated and difficult to apply in the classroom setting, the pervasiveness of computer usage impresses them and strengthens their belief that all students must become computer literate.

* Seeking ways to work with other teachers and maintaining their connections to the business in which they worked (Beutel et al., 1991). Having experienced a culture in which isolation is not the rule, teachers place new value on collegiality and teamwork in the academic workplace. Linn (1992) noted that "isolation and lack of opportunities for professional interaction are pivotal factors in teacher persistence." As interest grows in site-based management of schools and new role definitions for teachers that encourage collegiality and leadership, this aspect of work experiences may become more important in the retention of science and mathematics teachers.

* Adding career information to the curriculum (Andreen, 1991; Beutel et al., 1991; Clark, 1990; Ehrman et al., 1991). Armed with a broader view of the world of work and insights into the needs and priorities of the workplace, teachers can inform students and encourage them to consider careers in mathematics and science.

* Gaining in self-esteem (Andreen, 1991; Ehrman et al., 1991; Gottfried, 1992; University of California, 1991a). As teachers learn new skills and content, they call upon academic and technical knowledge they already possess; they interact on a professional level with scientists and business people; their self-confidence grows; and they realize that they could succeed in the corporate world--if they wanted to.

* Affirming their decisions to become teachers (Clark, 1990). Teachers express amazement at the freedom they find in business--they can make a phone call when they want to, visit the restroom when they need to, and relax during lunch. There is time to think. Even so, teachers report a renewed enthusiasm for teaching and a revitalized commitment to their profession. They are anxious to return to the classroom to share

their experiences with students. Though there are no accurate statistics on how many teachers actually leave teaching to work in the private sector, IISME found an annual attrition rate of about 5% per year, similar to the national attrition rate of 5-6% (University of California, 1991b).

EFFECTS ON BUSINESS

Partnerships also promote a new appreciation by business of teachers and the teaching profession (Stirling, 1992). When business representatives visit schools, they are confronted with classroom conditions. They gain insights into the paucity of resources in schools and the challenging conditions in which teachers work.
Businesses are also usually impressed by the proficiency of teachers in the corporate workplace, and evaluations of teacher performance are overwhelmingly positive (University of California, 1991b). Skills that successful teachers have developed in such areas as organizing, establishing objectives, and communicating are valued, respected, and appreciated by businesses. Teachers take initiative on the job, are self-motivated, and participate as valuable team members with fresh, enthusiastic perspectives.

CONCLUSION

Partnerships that include scientific work experiences for teachers have resulted from businesses seeking to assist in the improvement of public education. As desirable as partnerships appear, as revitalizing as they are for teachers, and as eye-opening as they may be for business, only a small fraction of science and mathematics teachers are able to participate in scientific work experiences, and no one knows whether partnerships really make a difference. As Atkin (1991) pointed out, partnerships are fragile entities that are not institutionalized but depend on good will, trust, and the belief that partnerships are a necessary investment in the future and that they will, indeed, make a difference. Perhaps scientific work experience partnerships will prove to be so successful that they will become not only institutionalized but indispensable.
RESOURCES FOR INFORMATION ON SCIENTIFIC WORK EXPERIENCE PROGRAMS

* Department of Energy TRAC program. Department of Energy National Laboratories (202: 586-1634). Teachers work for 8 weeks in one of DOE's national laboratories; 200 teachers per year participate in TRAC.

* Directory of Scientific Work Experiences Programs for Teachers, available from IISME, 1636 Madrono Ave., Palo Alto, CA 94306-1017 (415: 326-4800). Describes and

names contacts for 64 of the 84 known scientific work experience programs in the nation.

REFERENCES

Andreen, B. (1991, October). University lab model. Proceedings of the National Conference of Scientific Work Experience Programs for K-12 Teachers. Berkeley, CA: University of California.
Atkin, J. M. (1991, October). New partnerships and alliances--getting practical. Proceedings of the National Conference of Scientific Work Experience Programs for K-12 Teachers. Berkeley, CA: University of California.

Allstate Insurance, & Fortune Magazine. (1989). Business response to education in America . Author.

Beutel, C., Khashabi, D., & Marriott, S. (1991, October). Teacher voice project. Proceedings of the National Conference of Scientific Work Experience Programs for K-12 Teachers. Berkeley, CA: University of California.

Clark, R. J. (1989). The MESTEP record: A report on the first six years. Massachusetts University. ED 318 734

Clark, R. J. (1990). Extending the boundaries of teacher education through corporate internships. Journal of Teacher Education, 41(1), 71-76.

Council for Aid to Education. (1989). Business and the schools: A guide to effective programs. Author.

Education Resources Group, Inc. (1991). An overview of evaluation research on selected educational partnerships. ED 325 536

Ehrman, P., Treadwell, G., & Young, J. (1991, October). Maximizing our impact on science and mathematics education. Proceedings of the National Conference of Scientific Work Experience Programs for K-12 Teachers. Berkeley, CA: University of California.

Farrell, A. M. (1992, March). What teachers can learn from industry internships. Educational Leadership, 49(6), 38-39.

Gottfried, S. (1992, Fall). The evaluation of scientific work experience programs. Network for Success, 1(2), 8-9.

Gottfried, S. S., Brown, C. W., Markovits, P. S., & Changar, J. B. (1993). Scientific work experience programs for science teachers: A focus on research-related internships. Excellence in Educating Teachers of Science: AETS Yearbook. Columbus, OH:

ERIC/CSMEE. (ED 355 111)

Kubota, C. (1991). Ford fellows science/mathematics project annual report. University of Washington.

Linn, M. C. (1992). Science education reform: Building on the research base. Journal of Research in Science Teaching, 29(8), 821-840.

National Alliance of Business. (1988, May). Business Week. [Special Section].

National Association of Partners in Education. (1991). National school district partnership survey. Author.

Stirling, L. (1992, December). Businesspeople tackle school teaching. Phi Delta Kappan, 342-343.

University of California. (1991a, October). Partners in education: The IISME experience, 1985-1990. Berkeley, CA: Author.

University of California. (1991b, October). Sharing our successes. Proceedings from the National Conference of Scientific Work Experience Programs for K-12 Teachers. Berkeley, CA: Author.

Dr. Carole Kubota is a Research Assistant Professor and Director of Programs of the Ford Fellows Science/Mathematics Project in the College of Education, University of Washington

-----

This digest was funded by the Office of Educational Research and Improvement, U. S. Department of Education under contract no. RI88062006. Opinions expressed in this digest do not necessarily reflect the positions or policies of OERI or the Department of Education.

Title: Education-Business Partnerships: Scientific Work Experience Programs. ERIC/CSMEE Digest.
Document Type: Information Analyses---ERIC Information Analysis Products (IAPs) (071); Information Analyses---ERIC Digests (Selected) in Full Text (073);
Available From: ERIC Clearinghouse for Science, Mathematics and Environmental

Education, 1929 Kenny Road, Columbus, OH 43210-1080 (First copy free, additional copies, $0.25 each.)
Descriptors: Career Awareness, Corporate Support, Elementary School Science, Elementary Secondary Education, Higher Education, Industry, Inservice Teacher Education, Partnerships in Education, Private Sector, Professional Development, School Business Relationship, School Support, Science Curriculum, Science Education, Science Teachers, Secondary School Science, Teaching Methods
Identifiers: ERIC Digests
###

[Return to ERIC Digest Search Page]